

Name: \_\_\_\_\_ TP: \_\_\_\_\_

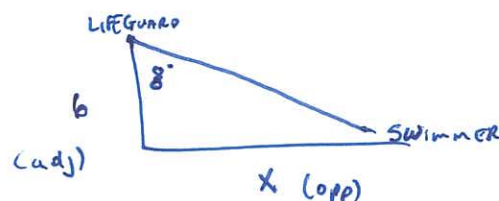
<b>CRS</b>	<b>FUN 502</b> Express sine, cosine, and tangent of an angle in a right triangle as a ratio of given side lengths; <b>FUN 602</b> Apply basic trigonometric ratios to solve right triangle problems. <b>G-SRT.8</b> Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
<b>Objective</b>	10.4 Write a ratio for sine, cosine, and tangent when side lengths are variables or number values given a figure, given a word problem, or given one of the side length ratios OR given the angle measure and one side length of a right triangle, find the side length of the triangle

Example 2 (record in your notebook):

SOH CAH TOA

**EMERGENCY** A search and rescue team is airlifting people from the scene of a boating accident when they observe another person in need of help. If the angle of depression to this other person is  $42^\circ$  and the helicopter is 18 feet above the water, what is the horizontal distance from the rescuers to this person to the nearest foot?

1) **LIFEGUARDING** A lifeguard is watching a beach from a line of sight 6 feet above the ground. She sees a swimmer at an angle of depression of  $8^\circ$ . How far away from the tower is the swimmer? about 43 ft



2) **CIRCUS ACTS** At the circus, a person in the audience at ground level watches the high-wire routine. A 5-foot-6-inch tall acrobat is standing on a platform that is 25 feet off the ground. How far is the audience member from the base of the platform, if the angle of elevation from the audience member's line of sight to the top of the acrobat's head is  $27^\circ$ ? about 60 ft

3) **DISTANCE** Maria is at the top of a cliff and sees a seal in the water. If the cliff is 40 feet above the water and the angle of depression is  $52^\circ$ , what is the horizontal distance from the seal to the cliff, to the nearest foot? 31 ft

4) **BASEBALL** A fan is seated in the upper deck of a stadium 200 feet away from home plate. If the angle of depression to the field is  $62^\circ$ , at what height is the fan sitting? 176.6 ft

## What will Trig look like on the ACT?

1) In the figure below,  $\triangle ABC$  is a right triangle with a right angle at C. Which of the statements about this figure is NOT correct?

$\sin = \frac{\text{opp}}{\text{hyp}}$        $\cos = \frac{\text{adj}}{\text{hyp}}$

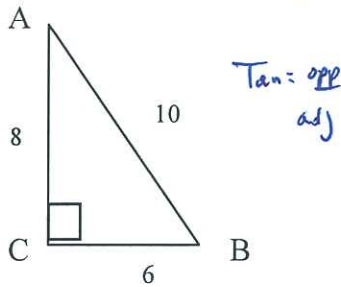
A.  $\sin A = \frac{6}{10}$

B.  $\cos A = \frac{8}{10}$

C.  $\cos B = \frac{8}{10}$

D.  $\tan A = \frac{6}{8}$

E.  $\tan B = \frac{8}{6}$



$\tan = \frac{\text{opp}}{\text{adj}}$

2) You lean a 16 foot ladder against the wall. If the ladder makes an angle of  $70^\circ$  with the ground, how far away from the wall is the base of the ladder? Round your answer to the nearest tenth of a foot.

$\cos 70^\circ = \frac{x}{16}$

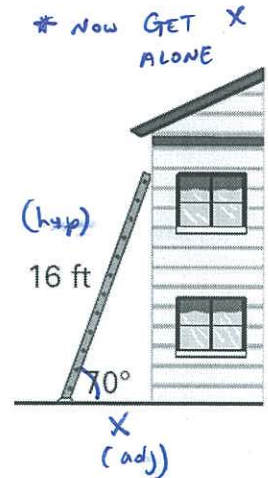
Can put into

Calculator

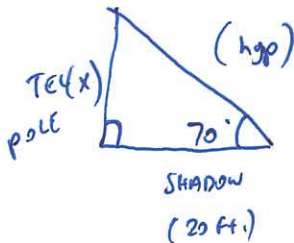
Should get

decimal)

- A. 46.8 feet
- B. 44.0 feet
- C. 17.0 feet
- D. 15.0 feet
- E. 5.5 feet



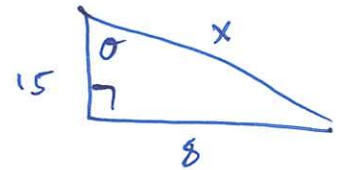
3) The shadow of a telephone pole is 20 feet long. You measure the angle of elevation from the end of the shadow to the top of the telephone pole to be  $70^\circ$ . Which of the following would give you the height of the pole?



- A.  $20 \cdot \sin 70$
- B.  $20 \cdot \cos 70$
- C.  $20 \cdot \tan 70$
- D.  $70 \cdot \sin 20$
- E.  $70 \cdot \tan 20$

4) \_\_\_\_ An angle in a right triangle has a measure  $\theta$ .

If  $\tan \theta = \frac{8}{15}$ , then  $\sin \theta = ?$



A.  $\frac{8}{15}$

C.  $\frac{15}{17}$

B.  $\frac{8}{17}$

D.  $\frac{17}{15}$

E.  $\frac{15}{8}$

FIND X

USING

PYTHAGOREAN THEOREM

5) You have an extension ladder that you are using to repair a chimney. Which of the following is a trig ratio that could be used to find the length required for the extension ladder to reach a height of 14 ft for the chimney?

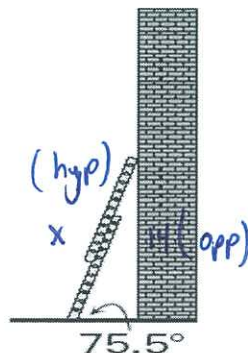
A.  $\frac{14}{\sin 75.5}$

B.  $\frac{14}{\cos 75.5}$

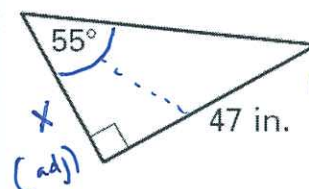
C.  $14 \cdot \sin 75.5$

D.  $14 \cdot \cos 75.5$

E.  $\frac{75.5}{\sin 14}$



6) Find the perimeter of the triangle. Round to the nearest tenth.



Find the perimeter

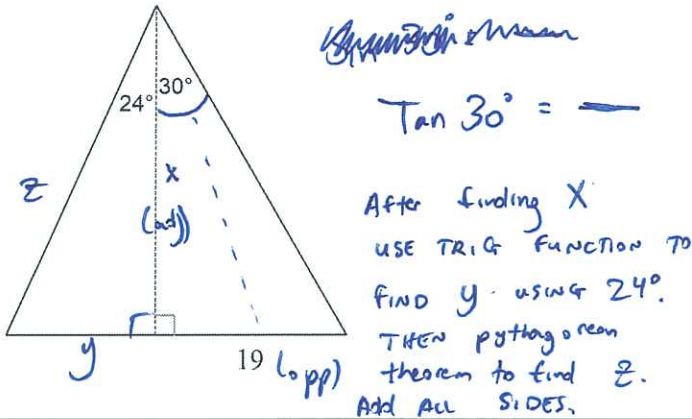
$\tan 55^\circ = \frac{47}{x}$

- A. 37.9 in
- B. 57.4 in
- C. 137.3 in
- D. 161.8 in
- E. 186.3 in

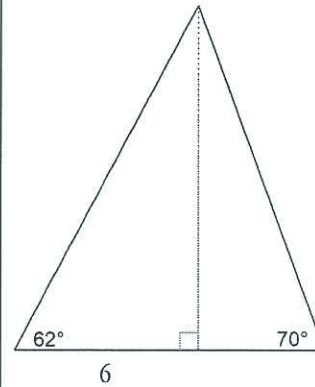
After finding  $x$  use  
pythagorean theorem to  
find hypotenuse.



7) Find the area of the largest triangle. Round intermediate values to the nearest tenth. Use the rounded values to calculate the next value. Round your final answer to the nearest tenth.



8) Find the perimeter of the larger triangle. Round intermediate values to the nearest tenth. Use the rounded values to calculate the next value. Round your final answer to the nearest tenth.

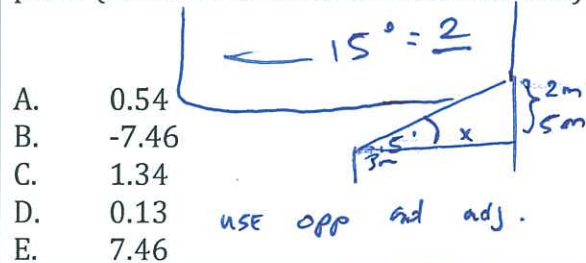


9) If in a right triangle  $\tan \theta = \frac{x}{5}$  and  $\sin \theta = \frac{x}{13}$ , then  $x = ?$



- A. 1
- B. 7
- C. 12
- D. 144
- E. Cannot be determined from given information

10) Two vertical poles, one 3 meters tall and the other 5 meters tall, stand a certain distance apart. A line from the top of the shorter pole to the top of the taller pole makes a  $15^\circ$  angle with a horizontal line. Which of the following expresses the horizontal distance, in meters, between the bases of the two poles (rounded to the nearest hundredth)?



- A. 0.54
- B. -7.46
- C. 1.34
- D. 0.13
- E. 7.46

11) **Inclined Plane** See the illustration. If friction is ignored, the time  $t$  (in seconds) required for a block to slide down an inclined plane is modeled by the function

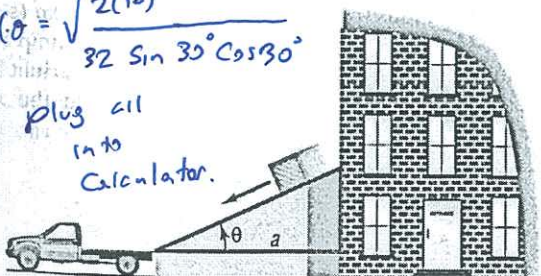
$$t(\theta) = \sqrt{\frac{2a}{g \sin \theta \cos \theta}}$$

where  $a$  is the length (in feet) of the base and  $g \approx 32$  feet per second per second is the acceleration due to gravity. How long does it take a block to slide down an inclined plane with base  $a = 10$  feet when

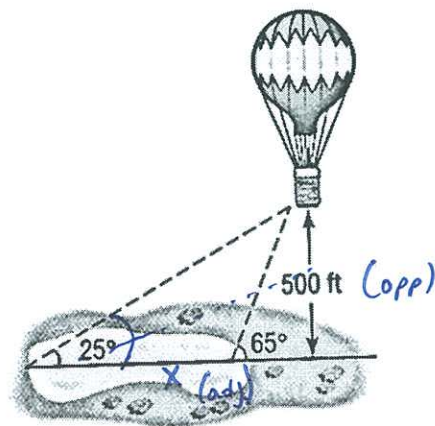
- (a)  $\theta = 30^\circ$ ?    (b)  $\theta = 45^\circ$ ?    (c)  $\theta = 60^\circ$ ?

$$t(\theta) = \sqrt{\frac{2(10)}{32 \sin 30^\circ \cos 30^\circ}}$$

plug all into calculator.



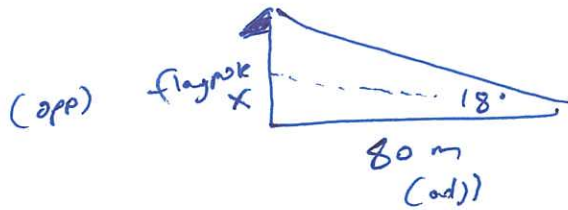
12) Measuring the Length of a Lake From a stationary hot-air balloon 500 ft above the ground, two sightings of a lake are made (see figure). How long is the lake?



$$\tan 25^\circ = \frac{500}{x}$$

**Solve the following word problems. For each question, draw a diagram to help you.**

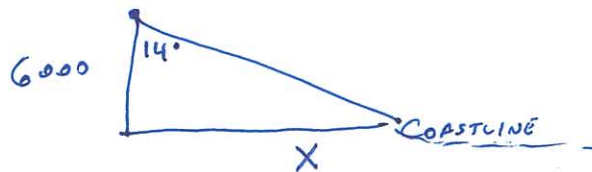
13) From a horizontal distance of 80.0 m, the angle of elevation to the top of a flagpole is  $18^\circ$ . Calculate the height of the flagpole to the nearest tenth of a meter.



14) The angle of elevation of the sun is  $68^\circ$  when a tree casts a shadow 14.3 m long. How tall is the tree, to the nearest tenth of a meter?

15) A person flying a kite has released 176 m of string. The string makes an angle of  $27^\circ$  with the ground. How high is the kite? How far away is the kite horizontally? Answer to the nearest meter.

16) An airplane is flying at an altitude of 6000 m over the ocean directly toward a coastline. At a certain time, the angle of depression to the coastline from the airplane is  $14^\circ$ . How much farther (to the nearest kilometer) does the airplane have to fly before it is directly above the coastline?



1000 m = 1 km

17) You are skiing on a mountain with an altitude of 1200 meters. The angle of depression is  $21^\circ$ . About how far do you ski down the mountain?

**JOKES ON JOKES ON JOKES:** "Have you heard the one about the **geometer** who went to the beach to catch some **rays** and came back a **tangent**?" –Inspired by Sally Huang

**Zest.**